

ASSESSMENT OF AVIAN MORTALITY FROM COLLISIONS AND ELECTROCUTIONS

Chapter One: Avian Fatalities from Interactions with Wind Turbines

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Background on Wind Development

- California was one of the first states to begin developing its wind resources
- Wind was developed prior to knowledge of avian impacts
- Development of wind energy has varied over the years based on federal and state tax credits
- In 1998 Alameda County implemented a moratorium on additional wind development at the existing cap (~580 MW) until avian issues could be addressed



History of Energy Commission Research on Avian Mortality Issues

- Sponsored early research that identified avian mortality as a problem (Estep 1989)
- Funded bird use studies at the Altamont Pass, Solano County, and Tehachapi (Orloff 1992 and Orloff and Flannery 1992 and 1996)
- Co-funded additional bird use studies in Tehachapi and San Geronio (Anderson 2004 and in press)
- The latest 4 year study at the Altamont Pass was also funded by the California Energy Commission (Smallwood and Thelander 2004, Smallwood and Neher 2004)



History of Energy Commission Policy on Avian Mortality Issues

- The Energy Commission has supported wind development for many years dating back to the 1980s
- Wind projects provide energy without using fossil fuels and without air quality impacts
- Wind projects are an important resource that will help meet the Renewable Portfolio Standard
- Wind energy project impacts have been discussed in the 2001 and 2003 Environmental Performance Reports
- The *2004 Integrated Energy Report Update* identified avian mortality as the largest environmental barrier to wind development
- The *2004 Update* also recommended implementation of mitigation measures at the Altamont Pass from Smallwood and Thelander 2004



Regulatory Background

- Most avian species killed by wind turbines are protected by the Migratory Bird Treaty Act
 - No provision for “take” in the MBTA
- Golden Eagles are protected under the Bald and Golden Eagle Protection Act
- Raptors are protected by additional California Fish and Game codes
- In the Endangered Species Act there is a provision for take – so far endangered species have not been a problem
- There are no protected bat species although several are being considered for listing



Wind Energy Siting and Survey Guidance Documents

- The U.S. Fish and Wildlife Service issued interim guidelines
 - Includes survey requirements, site evaluation, avoidance measures, post construction monitoring
- National Wind Coordinating Committee
 - Avian Subcommittee published guidance on survey methodology for determining and monitoring impacts
 - Siting Subcommittee published a handbook on guidelines for permitting wind facilities



Siting Background

- Wind projects are permitted by a local agency
 - Local agency completes CEQA documentation
 - Different counties have varying survey and mitigation requirements
 - Opportunity for consultation with CDFG and the USFWS
 - Utility districts complete their own CEQA documents



Trends in Wind Energy Development

- Repower existing sites – replace old less efficient small turbines with new large turbines
- Expansion of wind facilities into new areas, including secondary wind areas
 - 254 MW proposed for construction (AWEA)
- Using larger and more reliable turbines
 - Usually 1 megawatt (MW) or above
 - Larger rotor swept area, taller
 - Lights are also being required by the FAA



Trends in Wind Energy Development (Continued)

- The Bureau of Land Management has recently developed a Programmatic Environmental Impact Statement for development of BLM lands in the Western States
- Consolidation of owners since the 1980's
 - In 1985 42 operators owned 10,914 turbines
 - In 2003 18 operators own 11,941 turbines



Why Avian Fatalities Occur

- Bird behavior differs by site and by species
- Fatalities occur when turbine blades and birds occupy the same space
- Perching rates and tower types have not been shown to affect fatality rates
- Bird risk differs by species, location, and terrain
- Turbines can be sited in areas to minimize interactions between birds and turbines



Bat Fatalities- An Emerging Issue

- Bat collisions with wind turbines were not identified as an issue in early reports; however surveys for bats were not conducted
- Long periods between surveys may result in most bats being scavenged by predators
- Large numbers of dead bats have been found in two wind areas on the east coast
- At the High Winds project in Solano County, surveys have been detecting large numbers of bats, although less than on the east coast



Bat Fatalities An Emerging Issue Cont'd

- At the High Winds project in Solano County surveys are occurring every two weeks
- Bats may be colliding during migration, while foraging, may turn off echo location, may not be able to detect blades, may be foraging near the blades because of insects in the rotor swept area
- The Bat and Wind Energy Cooperative was originally formed in 2003 to develop a bat survey protocol and mitigation measures



Introduction to the Wind Resource Areas

- Avian fatalities continue to be an issue impacting birds, wind repowering and wind expansion
- In Solano County surveys have identified bird and bat deaths in high numbers
- Avian collisions have also resulted in a lawsuit in Alameda County by the Center for Biological Diversity
- The level of bird and bat research differs by wind resource area
- Bird and bat fatalities differ by wind resource area
- It can be difficult to compare research results depending on the metric used



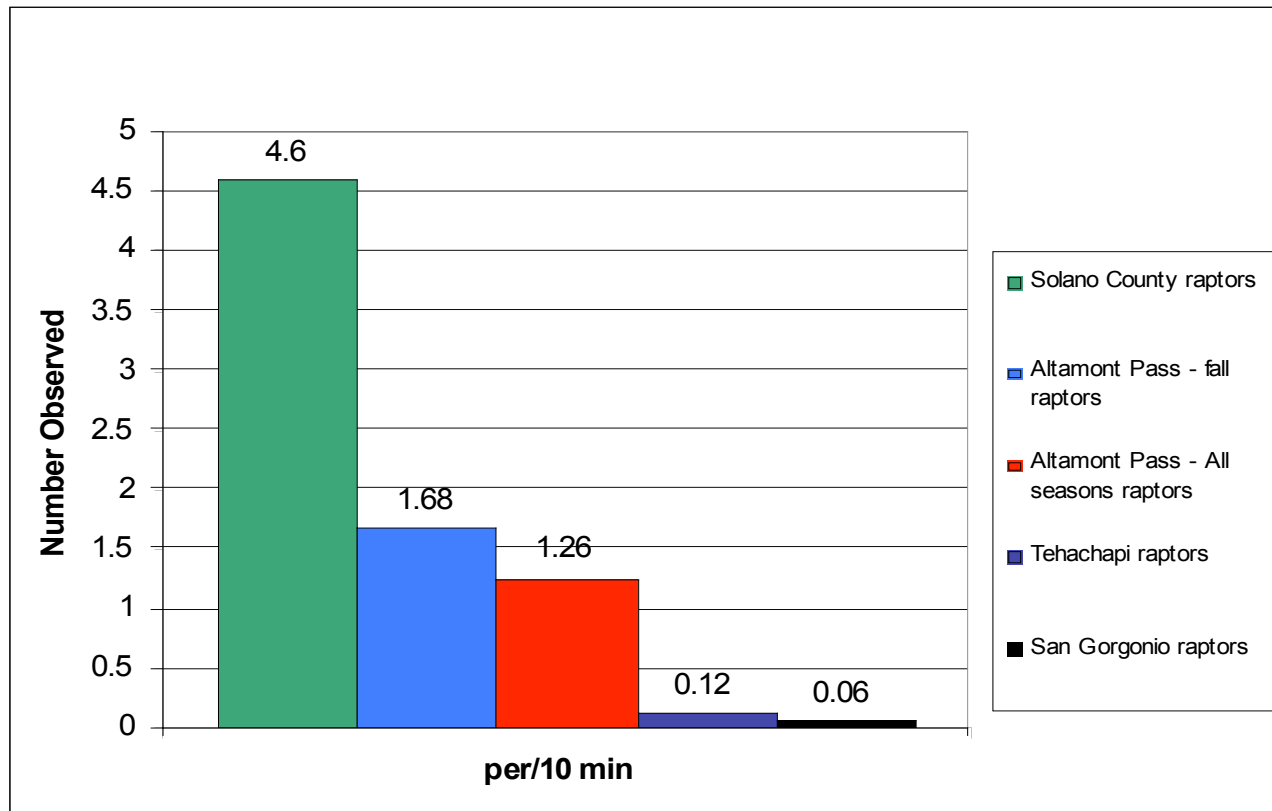


Wind Resource Areas In 2003

Wind Resource Area	Number of Turbines	Megawatts (MW)	Million Kilowatt Hours (kWh)
Altamont Pass	4955	494	822
Solano County	707	227	295
Tehachapi Pass	3591	656	1634
San Geronio Pass	2746	439	919
Pacheco Pass	166	17	24



Raptor Use per Ten Minute Scan



Sources: Orloff 1992, Smallwood and Thelander 2004, Anderson 2004 and personal communication 2005



Avian and Bat Fatalities/MW/year Unadjusted (UA) and Adjusted for Searcher Bias and Scavenger Rates (A)

Wind Resource	Bats	All Birds	Raptors
Altamont -UA		0.55	1.13
Altamont -A		8.14	2.24
San Geronio -A			0.1
Solano -UA	0.44	0.33	0.65
Tehachapi -UA		0.72	0.25
Tehachapi -A			0.3

Sources: Smallwood and Thelander 2004, Anderson 2004 and personal communication 2005, and calculated from High Winds data



Altamont Pass Wind Resource Area

- Developed prior to knowledge of bird fatalities
- Has been well studied over the last 20 years
- An adequate understanding of bird use
- Fatality rates are higher here then elsewhere
- A comprehensive 4 year study resulted in recommended mitigation measures (Smallwood and Thelander 2004)
 - Study estimated 1,766-4,721 birds including 881-1,300 raptors are killed annually
- Mitigation needs to be implemented Altamont wide and effectiveness monitored



Altamont Pass Wind Resource Area

- Turbine owners have agreed in concept to remove high risk turbines or a partial seasonal shut down
- Renewal of use permits have been constrained by the lawsuit by the Center for Biological Diversity
 - The appellants are requiring mitigation to be implemented
 - A working group was established
- In Contra Costa County the Buena Vista project has committed to implement most mitigation and monitoring from the PIER study
 - Siting turbines in low risk areas
 - The permitting process was completed timely
- Resolving avian fatalities could lead to lifting the moratorium and settlement of the lawsuit, which ultimately could lead to additional MW



Solano County Wind Resource Area

- For some raptor species bird use is higher here than the Altamont Pass (Orloff and Flannery 1992)
- High Winds is required to monitor every two weeks - 90 turbines at 162 MW capacity
 - Found 114 bats, 104 non raptor avian and 95 raptor deaths
- Survey results indicate a relatively high level of fatalities/MW/year (unadjusted); 0.92 birds, 0.04 raptors and 0.64 bats
- The frequent search interval may contribute to finding high numbers of dead bats
- Difficult to extrapolate out to the entire area



Solano County Wind Resource Area

- Solano County Wind Resource Area is an example of an area that has high bird use and high fatality rates
- A recently permitted project, Shiloh I, is required to provide habitat compensation
- Shiloh I is also implementing mitigation designed for Altamont Pass
 - Altamont Pass mitigation designed because of bird use behavior that might be site specific
 - Altamont Pass wind turbines are smaller
- Monitoring is needed to determine if the mitigation is effective here as Shiloh I is using large turbines



Pacheco Pass Wind Resource Area

- One owner in the Pacheco Pass
- Wind turbines are located in Pacheco State Park
- No studies have been conducted
- No current plans to repower the site



San Geronio Wind Resource Area

- One study of bird use and risk conducted in the mid 1990's (Anderson in press)
- Draft data shows a low incidence of raptor collision
- New development is occurring in the wind resource area
- Anderson recommends follow up studies to more accurately determine annual bird fatality rates



Tehachapi Wind Resource Area

- Early studies found low bird use, and low fatality rates
- Raptors appear to be more susceptible to collision than other birds (Anderson 2004)
- Red-tailed hawks, great horned owls and American kestrels had the highest collision rates (Anderson 2004)
- Tower type not likely related to collision risk
 - Supported in Smallwood and Thelander at the Altamont Pass



Out of State

- The first offshore development is being proposed in Nantucket Sound, MA
- 18 other states have developed RPS goals
- Washington State has developed wind siting and mitigation guidelines in an attempt to standardize preconstruction, permitting and post construction requirements
 - They are voluntary
 - Permitting is completed by the local agency



- Pier Presentation

